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ABSTRACT

A study examined whether (1) subjects' comprehension and recall of an expository passage would improve if they were given information about the organization of the passage before they read it, (2) the effects of being given such information would be similar across various hierarchical levels of the passage, and (3) the effects would be similar with differently organized passages. The subjects, 224 ninth grade students, were randomly assigned to one of four prereading treatments--structural organizer with outline grid, which consisted of information on the organization of the passage and a skeleton outline depicting the passage organization; structural organizer without outline grid; control condition with notetaking; and control condition without notetaking. Target passages were organized with adversative, attribution, covariance, or response organizational patterns. Results indicated that the structural organizer with outline grid reliably and markedly facilitated subjects' comprehension and recall, that notetaking alone reliably and markedly facilitated comprehension and recall, and that the structural organizer without outline grid reliably facilitated comprehension but not recall. Additional findings were that the effect was similar across the four organizational patterns and across various hierarchical levels of the passages. (Author/FL)

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Effects of Structural Organizers on Ninth Grade Students' Comprehension and Recall of Four Patterns of Expository Text

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Abstract

This study examined the effects of providing subjects with prior information about the organization of expository passages. Subjects, 224 ninth graders, were randomly assigned to one of four pre-reading treatments: structural organizer with outline grid, which consisted of information on the organization of the passage and a skeleton outline depicting the passage organization; structural organizer without outline grid; control condition with notetaking; or control condition without notetaking. Target passages were organized with adversative, attribution, covariance, or response organizational patterns. Results indicated that the structural organizer with outline grid reliably ($p < .01$) and markedly facilitated subjects' comprehension and recall, that notetaking alone reliably ($p < .01$) and markedly facilitated comprehension and recall, and that the structural organizer without outline grid reliably ($p < .01$) facilitated comprehension but not recall. Further findings were that this effect was similar across the four organizational patterns and across various hierarchical levels of the passages.

Effects of Structural Organizers on Ninth Grade Students' Comprehension and Recall of Four Patterns of Expository Text

Educators, linguists, and psychologists recognize that reading comprehension involves skill in following the organization of a passage (Aulls, 1982; Carroll, 1972; de Beaugrande, 1980; Glaser, 1979; Goelman, 1982; Herber, 1978; Kintsch & Yarbrough, 1982; Macdonald-Ross, 1978; Niles, 1974; Smith, 1963; van Dijk, 1977, 1980). Currently, researchers are investigating several unresolved issues concerning the relationship between passage organization and reading comprehension (Bartlett, 1979; Brandt, 1979; Britton, Glynn, Meyer, & Penland, 1982; Horowitz, 1982; McGee, 1982; Meyer, 1982; Meyer, Brandt, & Bluth, 1980; Meyer, Freedle, & Walker, 1977; Roen, 1982; Taylor, 1982). The present study examines three of these unresolved issues: First, will subjects' comprehension and recall of an expository passage improve if they are given information about the organization of the passage before they read it? Second, will the effects of being given such information be similar across various hierarchical levels of the passages? Third, will the effects be similar with differently organized passages?

The earliest work motivating interest in these three questions involved providing subjects with semantic information relevant to the content of expository passages prior to their reading the passages. Ausubel (1960, 1963, 1968) proposed that learning would be facilitated if the learner were supplied with

an appropriate frame of reference so that new information could be related to information the learner already possessed. In an attempt to demonstrate the facilitative effects of providing subjects with a frame of reference for new material, Ausubel (1963, 1968) developed the advance organizer. Despite the fact that advance organizers have frequently been shown to produce facilitative effects (Luiten, Ames, & Ackerson, 1980; Schallert, 1982), they continue to receive one major criticism. Critics have claimed that Ausubel has not provided adequate definitional criteria for his organizer, thus making replications of this research nearly impossible (Anderson, 1967; Anderson, Spiro, & Anderson, 1978; Barnes & Clawson, 1975; Hartley & Davies, 1976; Spiro & Anderson, 1981).

A second line of research motivating the present study is the work of Grimes (1975) and Meyer (1975), who have proposed a theory of discourse and a semantic grammar of propositions in which they develop the concept of rhetorical predicates. Rhetorical predicates are primarily responsible for giving prose its overall organization. Meyer (1975, 1981) has identified several types of these top-level structures, including adversative (claim-counterclaim), attribution (claim-support-conclusion), covariance (cause-effect), and response (problem-solution) rhetorical predicates.[1]

A third line of research motivating the present study is research investigating the effect of providing subjects with information about the organization of expository passages prior to their reading the passages. Several investigators have

suggested that providing subjects with such information will improve recall (Bartlett, 1979; Brandt, 1979; Meyer, 1975; Meyer, Brandt, & Bluth, 1980; Meyer, Bartlett, & Woods, 1978; Meyer, Freedle, & Walker, 1977; Slater, Palmer, & Graves, 1982). However, the results of these studies have been mixed.

Despite the mixed results generated by the research, the ability of readers to use the organization of a passage in recalling the passage is a predictor of how much information will be recalled (Meyer, Brandt, & Bluth, 1980; Meyer & Freedle, 1978; Meyer, Freedle, & Walker, 1977; Palmer, Slater, & Graves, 1980). It is perhaps not surprising that these studies produced mixed results because they display a number of weaknesses. First, most of these studies failed to provide subjects with sufficient information about the top-level structure of the passages. Second, the studies failed to assess subjects' prior knowledge about the content of the passages. Third, the passages used in many of the studies were short and/or contrived, thus raising the question of their ecological validity. Fourth, most of the studies failed to require subjects to directly interact with the structural information they were given. Fifth, most of the studies did not use multiple dependent measures.

A fourth line of research motivating the present study is research which has investigated the hypothesis that certain organizational patterns have greater facilitative effects on subjects' recall than others. In one study, Meyer and Freedle (1978) found that when the same passage content was organized in

each of four major organizational patterns, college students recalled more from claim-counterclaim and cause-effect top-level structures than from claim-support-conclusion structure. However, in another study, Meyer, Freedle, and Walker (1977) found that claim-counterclaim top-level structure, which seemed to facilitate recall for college students in the previous experiment, hindered recall in retired adult subjects. In addition to Meyer and her colleagues' two studies having produced contradictory results, it should be noted that a single passage was used in both studies and that generalization from a single passage to all passages is distinctly unwarranted (Clark, 1973). Moreover, Horowitz (1982) investigated the effects of these same four organizational patterns on high school and college subjects using different passages and found no effect of organizational pattern. Thus, the question of which, if any, patterns better facilitate recall remains unanswered.

The present study attempted to both build on previous studies and avoid their limitations in several ways. First, a new type of organizer, the structural organizer, was developed based on the work of Grimes (1975) and Meyer (1975, 1981). This organizer is not subject to the major criticism that has been leveled at Ausubel's advance organizer because its contents are specified by principled and objective content structure analyses of passages using the Meyer (1975) prose analysis system. The study avoided many of the other limitations of previous research by assessing subjects' prior knowledge, using multiple dependent measures, asking subjects to respond in

writing to the organizer content, and using representative expository passages.

Method

Subjects

A total of 224 ninth-graders in a suburban, midwestern high school participated in the study. School officials classified 90% of the students as middle class and 10% as lower class. They further noted that 98% of the students were white and that 10% of them qualified for a free or reduced price lunch. Subjects were classified as good, average, or low comprehenders on the basis of their scores on the reading comprehension subtest of the California Achievement Test (1977). The mean percentile scores for the good, average, and poor comprehenders were 89, 69, and 46, respectively. Equal numbers of subjects at each ability level were randomly assigned to each of 32 experimental cells.

Materials

The materials for the study consisted of target passages, general directions, pretests, directions for reading the passages, written recall protocol directions, posttests, and a questionnaire.

Target Passages. Eight well-organized passages of expository text were used in the study. The passages were taken from a junior high school history text titled The Free and the Brave (Graff, 1977), which had not been used in the school. Passages were selected and edited to be as similar as

possible on four dimensions. Each edited passage was 670-680 words long, contained 339 scoreable idea units (content words, semantic role relationships, and rhetorical relationships), had 5 hierarchical levels, and was written at the 8th grade level as measured by the Fry Readability Formula (1977).

Each passage was organized with one of the four top-level structures described by Meyer (1975), with two passages following the claim-counterclaim pattern, two following the claim-support-conclusion pattern, two following the cause-effect pattern, and two following the problem-solution structure.

To confirm the classification of the passages' top-level structures, two graduate students independently placed each of the eight passages in one of five categories: claim-counterclaim, claim-support-conclusion, cause-effect, problem-solution, or general. There was a 100% agreement among the raters, and no passage was placed in the general category.

After the top-level structure had been identified, the passages were parsed using the Meyer (1975) prose analysis system. Two graduate students independently analyzed each passage. The percentages of initial agreement between the raters ranged from 86% to 95%, with the mean percentage of agreement across the eight passages being 90%. Disagreements were resolved through discussion between the two graduate students.

General Directions. The same set of general directions was used with all subjects. These described the purpose of the

experiment and informed subjects that they would be taking a multiple-choice pretest, reading specific directions on how to read a passage, reading a passage, writing a recall protocol, taking a multiple-choice posttest, and completing a questionnaire.

Pretests and Posttests. A five-item, multiple-choice pretest designed to determine subjects' prior knowledge of target passage content was written for each of the eight passages. Each item consisted of a statement and four alternatives.

A twenty-item, multiple-choice posttest designed to provide one measure of recall was also written for each of the eight passages. Each item again consisted of a statement and four alternatives. Items for each test were focused on both the higher-level and lower-level content in the passages as identified in the content structure for each passage.

Spearman-Brown reliability coefficients for the eight multiple-choice comprehension tests ranged from .69 to .84, with a mean of .76.

Directions for Reading the Passages. Four sets of directions were used. Two of these were part of the experimental conditions, and two were part of the control conditions.

The directions for the two experimental conditions were called structural organizers. There were two types of structural organizers. The first type described the benefits of using top-level structure as an aid for retaining

information from text, defined the top-level organization of the target passage, provided a brief example of target passage top-level organization, and included an outline grid of the top-level organization of the target passage, which subjects were instructed to fill in as they read the passage. A brief note instructing subjects to write their recall protocols using the organization of the target passage followed the passage.

The second type of structural organizer was the same as the first one except that it did not contain an outline grid for subjects to fill in as they read.

The structural organizer for a cause-effect passage and the first few lines of the outline grid are shown below.

Covariance Structural Organizer

When reading non-fictional material, understanding the author's organization has three important advantages. It provides you with clues to remember much more of what you read. It helps you recall more of the major ideas in what you read, and it helps you to remember all of this information for a longer period of time.

Authors can organize their writing in several ways. One way of organizing a passage is to list causes and their effects. A cause and effect passage consists of a number of causes and a number of effects with supporting information related to each cause and effect. Additionally, a cause and effect passage may

include related topics and supporting information for these topics.

For example, you might read a passage about the causes and effects of the increase in fuel costs in the United States.

A cause might be the greater demand for fuel. Supporting information about the greater demand for fuel might include (1) details about how much the demand for fuel has increased up to the present and (2) details about how much the demand for fuel will increase in the future.

An effect might be increased fuel costs. Supporting information about increased fuel costs might include (1) details about how much fuel costs have increased and (2) details about how this increase in fuel costs reduces the distance people can afford to travel.

A related topic might be that of how fuel increases are forecast. Supporting information about how fuel increases are forecast might include (1) details about how fuel increases are forecast for air transportation and (2) details about how fuel increases are forecast for ground transportation.

The following outline shows the organization of the passage just described.

Rising Fuel Costs in the United States

1. Cause: Greater demand for fuel
   Support: How much the demand for fuel has increased up to the present
   Support: How much the demand for fuel will increase in the future
2. Effect: Increased fuel costs
   Support: How much fuel costs have increased
   Support: How this increase in fuel costs reduces the distance people can afford to travel
3. Related Topic: How fuel increases are forecast
   Support: Details about how fuel increases are forecast for air transportation
   [illegible]t: Details about how fuel increases are forecast for ground transportation

The passage you will read consists of a cause, effects, and related topics. It consists of 1 cause with supporting information, 3 effects with supporting information, and 9 related topics with supporting information. That is, it includes 1 cause, 3 effects,

and 9 related topics, and each of these is developed and explained in greater detail with supporting information.

As you read the passage, look for the cause, the effects, the related topics, and the supporting information. Causes, effects, or related topics are usually found in the first sentence of each paragraph, and supporting information related to a particular cause, effect, or related topic is usually found in the remaining sentences in a paragraph.

Starting on the next page, you will find a blank outline. Following the outline, there is a prose passage. As you read the passage, write down in phrases or sentences the cause, the effects, and the related topics of the passage and the supporting information on the outline. Do this as you are reading, not after you have finished reading. Every blank on the outline represents a sentence in the passage. The order of the blanks on the outline is the same as the order of the sentences in the passage.

Note that you must flip back and forth from the passage to the outline as you are filling out the outline.

Now read the passage carefully. Do not hurry. Please be certain to write in your starting time in the blank provided on the first page of the passage and your finishing time in the blank provided on the

last page of the passage. Also, remember that as you are reading, you will need to flip back and forth to fill in the outline.

Gold in California Outline Grid

1. Cause: _____
   - Support: _____
   - Support: _____
   - Support: _____
   - Support: _____
2. Related Topic: _____
   - Support: _____
   - Support: _____
3. Effect: _____
   - Support: _____
   - Support: _____
   - Support: _____

There were also two sets of directions for the control conditions. The first set of directions instructed subjects to read the target passage carefully and to take detailed notes while they were reading it. A brief note simply instructing subjects to write down everything they could remember from the target passage followed the passage.

The second set of directions was the same as the first except that it did not ask subjects to take detailed notes as they read.

Questionnaire The questionnaire consisted of five questions to which subjects responded "yes," "sometimes" or

"somewhat," and "no," and one open-ended question to which they wrote short answers if they chose to do so. The questionnaire was included to investigate the subjects' attitudes toward the various aspects of the experiment.

Experimental Packets. In the experimental condition, there were two types of packets. One type of experimental packet contained the general directions, the pretest, the structural organizer with the outline grid, the instructions for writing the protocols, lined paper, the multiple-choice posttest, and the questionnaire. The other type of experimental packet differed from the first type in that it contained the structural organizer without the outline grid.

In the control condition, there were also two types of packets. Both control packets differed from the experimental packets in that they did not include structural organizers and in that the directions for recall said nothing about passage organization. One control packet included a set of brief directions which told subjects to read the target passages and take detailed notes while they were reading it. The other included only a set of brief directions that simply told subjects to read the target passage.

Procedures

Subjects participated in the experiment during their normal classroom periods. Late passes were provided for those subjects who needed more time. Each subject received one packet of materials and was told to read them aloud. Then

silently while the experimenter read them aloud. Then subjects were invited to ask questions. After all questions had been answered, the subjects were instructed to begin. When subjects finished, they raised their hand, and the experimenter collected the packet and gave them a crossword puzzle to complete so that others would not be distracted. Subjects required between 27 and 58 minutes to complete the experiment.

Design and Analysis

The study employed a between subjects design, which differed slightly for each of two dependent measures. For both dependent measures, the design included two crossed factors and one nested factor. The crossed factors were Rhetorical Predicate (claim-counterclaim, claim-support-conclusion, cause-effect, problem-solution) and Treatment (structural organizer with outline grid, structural organizer without outline grid, control condition with notetaking, control condition without notetaking). Two levels of the other factor, Passage, were nested within each type of Rhetorical Predicate.

The dependent measures were the written recall protocols and the twenty-item multiple-choice posttest. In the analysis of the recall protocols, another crossed factor, Hierarchical Level with five levels, was included. In the analysis of the multiple-choice tests, a slightly different additional crossed factor, Question Level with two levels, was included. The analysis of variance and Newman-Keuls procedures were used to analyze the results obtained with each measure.

Scoring

The written recall protocols were analyzed for the number of idea units recalled. Two raters, neither of them the experimenter, scored the protocols. Each rater scored 124 randomly assigned recall protocols independently. In addition, the two raters scored 20 randomly assigned recall protocols in common in order to provide an estimate of interrater reliability. The Pearson Product-Moment correlation between raters was .92.

The procedures for counting idea units were those described by Meyer (1975). Specifically, each of the target passages was divided into propositions in the order in which they occurred in the passage. Next, each proposition was divided into a predicate and its accompanying arguments. Each argument was then given a role label, which indicated the semantic relationship between the argument and the predicate.

Each subject received one point for recalling an idea unit if the written recall protocol contained a verbatim or a recognizable paraphrase of content words, and an additional point if the role relationship or rhetorical relationship for the recalled idea unit was also present.

On the multiple-choice posttests, each subject received a score for the total number of items correct and scores for the number of items focused on higher-level information correct and the number of items focused on lower-level information correct.

Results

Analysis of the Pretests

The standard correction for guessing (Mehrens & Lehmann, 1978) was applied to subjects' pretest scores to provide a conservative estimate of their prior knowledge. Any negative scores were listed as 0. Percentages of correct responses for the eight passages ranged from 0% to 11%. Thus, subjects were essentially unfamiliar with the content of target passages.

Analysis of the Written Recall Protocols

The written recall protocols were analyzed in two ways. First, the total number of idea units recalled across all hierarchical levels was considered. Next, the percentages of idea units recalled at each of the five hierarchical levels were considered. The two analyses were necessary because the number of idea units at each hierarchical level differed across passages.

The first analysis made it possible to investigate the overall effects of Treatment, Rhetorical Predicate, and Passage. The second analysis made it possible to investigate the overall effect of Hierarchical Level and the possibility of a Treatment by Hierarchical Level interaction. These two analyses are discussed in turn.

Total Number of Idea Units Recalled. In order to analyze the effects of Treatment, Rhetorical Predicate, and Passage as measured by the number of idea units recalled, a three-way analysis of variance was run. The ANOVA indicated that the

only reliable effect was that of Treatment, F (3, 192) = 20.70, $p < .001$. Means and standard deviations for the main effects of Treatment are shown in Table 1. As can be seen, subjects

Insert Table 1 about here

recalled the largest number of propositions when receiving the structural organizer and completing the outline grid, the next largest number when taking notes, the next largest number when receiving the structural organizer alone, and the fewest number when they neither received the structural organizer nor took notes. The Newman-Keuls test indicated that all pairwise comparisons, except that between the Control Condition and the Structural Organizer, were reliable at $p < .01$.

Idea units at each hierarchical level recalled. In order to analyze the effect of Hierarchical Level and the possibility of a Treatment by Hierarchical Level interaction as measured by the number of idea units recalled, the numbers of idea units at each hierarchical level were converted to percentages of idea units at each level, the results were collapsed across the four rhetorical predicates and eight passages, and a two-way analysis of variance was run. The ANOVA indicated that the only reliable effects were those of Treatment, F (3, 220) = 20.20, $p < .001$, and Hierarchical Level, F (4, 880) = 15.69, $p < .001$. Since Treatment has been analyzed in the previous section and the Treatment by Hierarchical Level interaction was not reliable, the focus here is on Hierarchical Level. Means and standard deviations for the main effects of Hierarchical

Level are shown in Table 2. As can be seen, subjects recalled

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Insert Table 2 about here

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more higher-level propositions (Levels 1 and 2) than lower-level propositions (Levels 4 and 5), but more lower-level propositions (Levels 4 and 5) were recalled than middle-level propositions (Level 3). However, not all of these differences were reliable. The Newman-Keuls test indicated that the pairwise comparisons between Level 1 and Levels 3, 4, and 5 were reliable at $p < .01$. The pairwise comparison between Level 1 and Level 2 and that between Level 2 and Level 3 were reliable at $p < .05$, and the remaining five comparisons were not reliably different.

Analysis of the Multiple-Choice Tests

The results on the multiple-choice tests were also analyzed in two ways. First, the total number of correct responses was considered. Next, the percentages of correct responses to higher-level and lower-level questions were considered. The two analyses were necessary because the number of higher- and lower-level questions differed across passages.

The first analysis made it possible to investigate the effects of Treatment, Rhetorical Predicate, and Passage. The second analysis made it possible to investigate the overall effect of Question Level and the possibility of a Treatment by

Question Level interaction. These two analyses are discussed in turn.

Total Correct Responses on the Multiple-Choice Test. In order to analyze the effects of Treatment, Rhetorical Predicate, and Passage as measured by a multiple-choice test, a three-way analysis of variance was run. This ANOVA indicated that the only reliable effect was that of Treatment, F (3, 192) = 11.93, $p < .001$. Means and standard deviations for the main effects of Treatment are shown in Table 3. As can be seen, subjects scored highest on the multiple-choice test when

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Insert Table 3 about here

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receiving the structural organizer and completing the outline grid, the next highest when taking notes, the next highest when receiving the structural organizer alone, and the lowest when they neither received the structural organizer nor took notes. However, not all of the differences were reliable. The Newman-Keuls test revealed that the pairwise comparisons between the structural organizer with outline grid and the control condition, notetaking and the control condition, and the structural organizer alone and the control condition were reliable at $p < .01$, and that the remaining three comparisons were not reliably different.

Correct Responses to Higher-Level and Lower-Level Questions on the Multiple-Choice Tests. In order to analyze the effect of Question Level and the possibility of a Treatment by

Question Level interaction as measured by subjects' performance on higher-level and lower-level multiple-choice questions, the percentage of correct responses to questions dealing with higher-level information and the percentage of correct responses to questions dealing with lower-level information were calculated, the results were collapsed across the four rhetorical predicates and eight passages, and a two-way analysis of variance was run. The ANOVA indicated that the only reliable effects were those of Treatment, F (3, 220) = 11.67, $p < .001$, and Question Level, F (1, 220) = 18.03, $p < .001$. Since Treatment has been analyzed in the previous section and the Treatment by Question Level interaction was not reliable, the focus here is on Question Level. The means and standard deviations for the higher-level and lower-level questions were 74% and 79% respectively and 15% and 13% respectively.

Analysis of the Questionnaire

The students' responses to the first five questions of the questionnaire were converted to numerical indices, with 1 representing "yes," 2 representing "sometimes" or "somewhat," and 3 representing "no." The responses to the sixth item were simply summarized.

The first five questions and the numerical indices of students' responses to them are shown below.

1. Did you find any of the directions hard to follow? 2.8

2. Was the first short test difficult? 1.3

3. When you wrote down everything you could remember from the passage did you follow the directions that told you how to do so? 1.2

4. Was the passage you read easy to read? 2.2

5. Was the second test difficult? 1.7

It appears that students generally, (1) did not find the directions hard to follow, (2) did find the pretest on prior knowledge difficult, (3) did follow directions, (4) did find the passage somewhat difficult, and (5) did find the posttest somewhat difficult.

Question number six was the open-ended question show below.

6. Describe anything in your test packet that helped you to remember more from the passage.

The responses to question six indicated that eight subjects in the structural organizer with outline grid condition, ten subjects in the notetaking condition, and four subjects in the structural organizer alone condition mentioned that filling in the outline grid, taking notes, or being told about the organization of the passage helped them to remember more from the passage. Two subjects in the notetaking condition indicated that the general directions for the experiment helped

them to recall more from the passage. The remaining responses to question six were not relevant to the experiment.

Discussion

The study produced some expected results and some unexpected ones. Here, we first discuss those results, considering the extent to which they answer each of the three questions we posed in the introduction and two additional matters. Next, we discuss the educational implications of the study.

In regard to the first question, will students' comprehension and recall of expository text improve if they are given information about the organization of a text before they read it, the answer is a qualified yes, when either the results of the recall measure or those of the multiple-choice test are considered. Results on the recall measure indicated that students in the structural organizer with outline grid condition reliably and markedly outperformed students in the notetaking condition. However, there was no reliable difference between students' performances in the structural organizer alone condition and the control condition.

To better illustrate treatment gains, the results will be discussed in terms of gain scores, computed by using the control condition as a baseline. Students in the structural organizer alone condition recalled 13% more idea units than those in the control condition; students in the notetaking condition recalled 46% more idea units than those in the control condition; and the students in the structural organizer

with outline grid condition recalled 79% more idea units than students in the control condition. Thus, those who received a structural organizer and were required to fill in an outline grid which highlighted passage organization as they were reading markedly outperformed students in the other three conditions.

As noted, on the basis of the results on the multiple-choice test, the answer to the first question is also a qualified yes. Students in the structural organizer with outline grid condition did not score reliably higher than subjects in the notetaking condition. However, students in the structural organizer alone condition did score reliably higher than students in the control condition.

Again, gain scores computed by using the control condition as a baseline provide a readily interpretable illustration of treatment gains. Students in the structural organizer with outline grid condition and students in the notetaking condition scored 18% higher than students in the control condition, and students in the structural organizer alone condition scored 10% higher than those in the control condition. Thus, students who received a structural organizer and were required to fill in an outline grid which highlighted passage organization as they were reading outperformed students in two of the three other conditions. These results are in the same direction as those for the first dependent measure; however, it appears that answering the multiple-choice questions was less affected by the treatments than the writing of the recall protocols.

Taken together, the results of the two dependent measures indicate that structural organizers can facilitate students' comprehension and recall of expository text. This was the result we expected. What we did not expect was the very powerful effect of notetaking. Notetaking produced a stronger effect than the structural organizer alone. The gains when notetaking was present parallel those obtained in the Bartlett (1979) study in which the students were actively involved in discovering, naming, and applying the various organizational patterns; however, they contrast with the results obtained in the Meyer, Bartlett, and Woods (1978) and Brandt (1979) studies in which students were passive recipients of instruction and no gains in recall were found. We will discuss this matter further when we consider implications for further research.

At this point, we want to explicitly note that time was not equated across the four treatment groups. Students in the structural organizer alone condition spent more time on the text than students in the control condition, and students in both the notetaking condition and the structural organizer with outline grid condition spent more time on the text than students in the structural organizer alone condition. Completing such tasks takes time. However, our data clearly indicate the positive effects of taking the time to complete the tasks.

In regard to the second question posed in the introduction, will the effects of being given a structural organizer be similar across various hierarchical levels of passages, the answer is a definite yes. There was no reliable Treatment by

Hierarchical Level interaction with the recall measure and no reliable Treatment by Question Level interaction with the multiple-choice measure.

In regard to the third question posed, will the effects of being given information about the organization of a text be similar with differently organized types of expository text, the results on the recall measure and the multiple-choice test indicate that the answer again is yes. There were no reliable Treatment by Rhetorical Predicate interactions, as measured by either recall or the multiple-choice test.

In addition to providing information relevant to the three questions, the results also provide information on two other matters. These are the overall effects of different hierarchical levels and the overall effects of different types of rhetorical predicates.

As in previous studies, students recalled more higher-level propositions than lower-levels propositions on the recall measure. Specifically, they recalled 26% of the highest propositions (Level 1), 22% of the next highest, 18% of the next highest, 20% of the next highest, and 19% of the lowest (Level 5). In general, this trend of recalling more higher-level propositions supports previous research findings (Meyer, Brandt, & Bluth, 1980; Meyer & McConkie, 1973). However, the lack of reliable differences between Levels 3, 4, and 5 brings into some question the ability of the Meyer prose analysis system to consistently predict what information will be recalled from text. Moreover, on the multiple-choice test,

students scored 74% on the higher-level questions and 79% on the lower-level questions. These results are, of course, the opposite of what would be expected.

Taken together, the results of the two dependent measures indicate that the Meyer system does not consistently predict which information will be recalled from text. These results, which indicate that predicting recall of information from text based on hierarchical prose analysis systems can be unreliable, provide additional support for similar findings in recent research by Ballstaedt, Schnotz, and Mandl (1981), Meyer and Rice (in press), and Piché and Slater (1983).

Finally, regarding the second matter, which concerns the overall effects of different types of rhetorical predicates, results on the recall measure and multiple-choice test indicated no reliable differences between the four types of rhetorical predicates. Specifically, on the recall measure, subjects recalled 20% of the idea units for the claim-counterclaim, 21% for the claim-support-conclusion, 22% for the cause-effect, and 19% for the problem-solution rhetorical predicate. Similarly, on the multiple-choice test, subjects scored 79% for the claim-counterclaim, 75% for the claim-support-conclusion, 77% for the cause-effect, and 74% for the problem-solution rhetorical predicate.

Taken together, the results of the two dependent measures indicate that passage organization was not a powerful variable in this study. These results do not parallel the results obtained by Meyer (1977) and Meyer, Freedle, and Walker (1977),

who found reliable differences in recall between different types of organizational patterns, but they do parallel the results obtained by Horowitz (1982) who found no reliable differences in recall between different types of organizational patterns.

We turn now to the educational implications of the study. Results of this study support three conclusions about helping students learn from expository text. First, students are likely to comprehend and recall more from text if they receive well-defined information on the organization of a passage before they read it. Second, the facilitative effects of providing students with information on the organization of a passage are likely to be greatly heightened if students use that information to produce an outline of the text. Third, notetaking is likely to improve students' comprehension and recall of text. In fact, notetaking is very likely to markedly improve students' comprehension and recall.

In conclusion, we would like to emphasize the practical potential of structural organizers by repeating a comparison we have already presented. Students who received a structural organizer and completed an outline grid recalled 79% more idea units than those who merely read the texts. Moreover, two logistic factors severely constrained the instruction used in the present study. We believe that the procedures for presenting structural organizers can be strengthened and that the revised procedures are likely to produce considerably stronger results.

One constraint occurred because we wanted to employ truly random assignment of individual students to treatments but were not allowed to physically move students in and out of classrooms. As a result, students in each classroom were receiving different treatments, and instruction had to be delivered using paper and pencil exercises which students worked on independently. Had it not been for this constraint, we would have had teachers follow an active teaching model in which they explained just what was to be learned and why it needed to be learned, presented outlines of the organizational patterns on overheads and discussed them, modeled their own thought processes as they completed sample outline grids, got students actively involved in completing sample outline grids, provided students with appropriate feedback, and answered questions students had.

The other logistic constraint was that we were allotted only one class period for the instruction. Had this constraint not existed, we would have gradually led students from teacher-directed work with short prototypic passages to increasingly student-directed work with longer, less prototypic passages over an extended period of time.

We are currently designing a study in which the instruction has been modified in these two directions.

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[1] We have used the more technical terms for the four top-level structures with their more universal definitions derived from rhetoric in parentheses immediately following each term, e.g., adversative (claim-counterclaim); attribution (claim-support-conclusion); covariance (cause-effect); and response (problem-solution). Throughout the rest of the paper, we will refer to these four top-level structures by their rhetorical names.

[2] We have used these lengthy names for the four treatment conditions in our initial reference to the conditions in order to be precise. Throughout the rest of the paper, we will refer to these conditions as the structural organizer with outline grid, structural organizer alone, notetaking, and control conditions.

Table 1

Means and Standard Deviations for Total Idea Units Recalled for the Main Effect of Treatment

Treatment	*M*	*SD*
Structural Organizer with Outline Grid	92.50	24.80
Control Condition with Notetaking	75.82	34.50
Structural Organizer	58.93	29.36
Control Condition	52.20	24.22

Table 2

Percentage of Idea Units Recalled and Standard Deviations at Each Hierarchical Level

Hierarchical Level	*M*	*SD*
Level 1 (Higher-Level)	26%	14%
Level 2	22%	9%
Level 3	18%	8%
Level 4	20%	11%
Level 5 (Lower-Level)	19%	15%

Table 3

Means and Standard Deviations for Total Items Correct on the Multiple-Choice Test for the Main Effect of Treatment

Treatment	M	SD
Structural Organizer with Outline Grid	16.21	2.35
Control Condition with Notetaking	16.14	2.20
Structural Organizer	15.14	2.27
Control Condition	13.66	2.85